**Japanese Utility Model Laid-Open Publication No. 5-63068**

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Applicant: Sharp Corporation

[Title of the Utility Model] Resin Molded Type Luminescent Body

[Summary]
[Purpose] To prevent the axial intensity from being lowered when making the lens diameter smaller to realize narrow directivity and high axial intensity.
[Structure] A light emitting semiconductor element 2 is mounted in a recessed portion 1a which is sealed with a resin 5 of which the refractive coefficient is smaller than that of the molding resin 4. The interface between the molding resin 4 and the resin 5 forms a concave surface. Light emitted at the light emitting semiconductor 2 is condensed through the interface between the molding resin 4 and the resin 5 to be led to a lens of the molding resin 4.

## CLAIMS

[Utility model registration claim]

[Claim 1] The plastic-molded-type emitter characterized by having closed the inside of the aforementioned crevice with the resin of a low refractive index rather than the resin for closure, and making the interface of the resin and the aforem ntioned resin for closure into the concave surface which became depressed in the luminescence semiconductor d vice side in the plastic-molded-type emitter with which the luminescence semiconductor device was mounted in the crevice.

[Translation done.]

## DETAILED DESCRIPTION

[Detailed explanation of a design]

[0001]

[Industrial Application]

This design is related with the plastic-molded-type emitter which closed the luminescence semiconductor device by the translucency resin.

[0002]

[Description of the Prior Art]

Th typical plastic-molded-type emitter used for the emitted type display of light etc. is shown in drawing 5 . This plastic-molded-type emitter has two leadframes 1 and 1. Crevice 1a is prepared in the point of one leadframe 1, and wirebonding of the luminescence semiconductor device 2 mounted here is carried out to it to the leadframe 1 of another side. And the point of leadframes 1 and 1 is embedded in the resin 4 for closure focusing on the luminescence semiconductor device 2 in crevice 1a. An apical surface is formed in the shape of a semi-sphere, and the resin 4 for closure constitutes the convex l ns for condensing.

[0003]

It is condensed with the lens constituted with the resin 4 for closure, and the light emitted from crevice 1a of the luminescence semiconductor device 2 or the element mounting section shows desired directivity and transverse-plane intensity. Condensing with this lens is governed by L value (distance from a luminescence side to a lens center), and the diameter of a lens. Directivity and transverse-plane intensity are mostly determined by these two factors, generally, when all light enters in a lens, the diameter of a lens takes for becoming small, directivity becomes narrow gradually, and transvers -plane intensity goes up them. These directional characteristics are shown in drawing 6 . Using the relation between the diameter of a lens, and directivity, as shown in drawing 7 , the plastic-molded-type emitter of narrow dir ctivity and high transverse-plane intensity which set only the center section of the transverse plane of the resin 4 for closure to lens 4a is also developed.

[0004]

[Problem(s) to be Solved by the Device]

However, in the conventional plastic-molded-type emitter, if it becomes small exceeding a value with the diameter of a l ns, a part of light emitted from the crevice of a luminescence semiconductor device or the element mounting section will not carry out incidence to a lens (refer to drawing 7 ). Consequently, the fall of transverse-plane intensity is caused. Moreover, if the diameter of a lens is made small and directivity is narrowed since the electrode section of an element does not emit light when an electrode uses the luminescence semiconductor device located at the center, the directivity will serve as 2 mountain type as shown in drawing 8 . Therefore, transverse-plane intensity falls also in this case.

[0005]

This design is originated in view of this situation, and it aims at offering the plastic-molded-type emitter which can prevent the fall of th transverse-plane intensity at the time of making the diameter of a lens small.

[0006]

[Means for Solving the Problem]

In the plastic-molded-type emitter with which the luminescence semiconductor device was mounted in the crevice, the plastic-molded-type emitter concerning this design closes the inside of the aforementioned crevice with the resin of a low refractiv index rather than the resin for closure, and is characterized by considering as the concave surface which hollow d the interface of the resin and the aforementioned resin for closure in the luminescence semiconductor device side.

[0007]

[Example]

Hereafter, th example of this design is explained with reference to a drawing. Drawing of longitudinal section of the plastic-molded-type mitter which drawing 1 shows one example of this design, and drawing 2 are graphs which show the directional characteristics of the plastic-molded-type emitter of drawing 1 .

[0008]

A plastic-molded-type emitter has two leadframes 1 and 1. Crevice 1a is prepared in the point of one leadframe 1, and wirebonding of the luminescence semiconductor d vic 2 mounted h re is carried out to it by the gold streak 3 to the leadframe 1 of another side. The point of leadfram s 1 and 1 is mbedd d in the r sin 4 for closur except for the inside of crevic 1a. Th apical surfac center section locat d in the transvers plane of cr vice 1a is proj cted in the shap of a semi-sph re, and the resin 4 for closure constitut s minor diameter convex lens 4a for cond nsing. The refractive index of the resin 4 for closure is 1.5.

[0009]

In crevice 1a of a leadframe 1, it fills up with the r sin 5 of a low r fractive index rath r than the resin 4 for closure. When the refractive index of the resin 4 for closure is 1.5, as a resin 5, the precoat resin for stress relaxation (refractive index 1.4) can be us d. The resin 5 closed the luminescence semiconductor device 2 in crevice 1a, and has stuck it to the resin 4 for closure. The interfac of the resin 4 for closur and a resin 5 is the concave surface which becam d pressed in the

)010]
i this plastic-molded-type mitter, it reflects by the insid of direct or crevice 1a, and the light emitted from the minesc nce semiconductor device 2 pass s the r sin 5 in crevice 1a, and it carries out incid nc to the resin 4 for osur . The light which th interface of the resin 4 for closure and a r sin 5 is a concav surfac , and carries out cid nce to th resin 4 for closur from a resin 5 since the r fractive index of a resin 5 is smaller than the refractive index f th resin 4 for closure is condens d by the interface. That is, a resin 5 functions as a false lens for condensing. herefore, in th conventional plastic-molded-type mitt r, th light protruded from lens 4a of th resin 4 for closure can so b drawn in lens 4a. Therefore, the fall of the transv rse-plane int nsity at the time of making the diameter of a lens mall is prevent d, and narrow directivity and high transverse-plane int nsity ar realized.
oreover, even when an electrode is located at the cent r of the luminesc nce s miconductor device 2, directive 2 ountain inclination (refer to drawing 8 ) is eased by the condensing function of the interface of the resin 4 for closure, and r sin 5, and the increase in transverse-plane intensity is achieved by it.
)011]
rawing 3 is drawing of longitudinal section of the plastic-molded-type emitter in which other examples of this design are hown. This plastic-molded-type emitter is an SMD (Surface Mount Device) type, and has the insulating substrate 7 in hich th pattern 6 by plating was formed. Crevice 7a for mounting the luminescence semiconductor device 2 is prepared i the front face of an insulating substrate 7. Wirebonding of the luminescence semiconductor device 2 in crevice 7a is arri d out by the gold streak 3 to the pattern 6. Into crevice 7a, it fills up with the resin 5 with a refractive index smaller ıan the resin 4 for closure, and let the interface with the resin 4 for closure be a concave surface. In addition, the ıminating of the resin 4 for closure is carried out to the front face of an insulating substrate 7, and the core is set to onvex lens 4a. Also in this plastic-molded-type emitter, narrow directivity and high transverse-plane intensity are realized y the condensing function of the interface of the resin 4 for closure, and a resin 5.
)012]
rawing 4 is drawing of longitudinal section showing still more nearly another example of this design. this example is using ıe whol transverse plane of the resin 4 for closure as the lens to the above-mentioned example using a part of ransvers plane of the resin 4 for closure as a lens.
)013]
Effect of the Device]
s mentioned above, when based on the plastic-molded-type emitter concerning this design By having closed the inside of ıe crevice where the luminescence semiconductor device was mounted with the resin of a low refractive index rather than ı resin for closure, and having made the interface of the resin and the aforementioned resin for closure into the concave urface Since a false concave lens is formed in the incidence side of the lens by the resin for closure and a condensing ınction is added, ven if the diameter of a lens is small, incidence of the whole quantity of the luminescence quantity of ght can be carried out to a lens, and transverse-plane intensity can be raised further. Moreover, even when an electrode is ɔcated at the c nter of a luminescence semiconductor device, directive 2 mountain inclination is eased by the condensing ınction of a false lens, and the increase in transverse-plane intensity is achieved by it. Therefore, narrow directivity and ıgh transvers -plane intensity are realized.

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Translation don .]

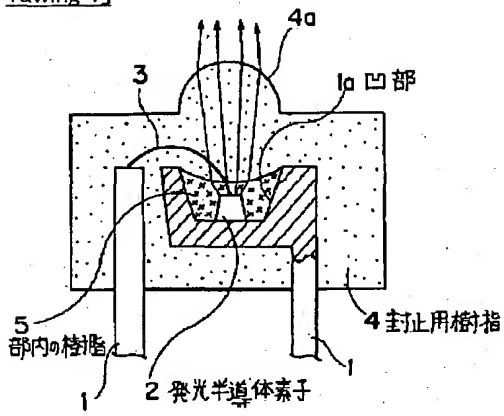
## ESCRIPTION OF DRAWINGS

3rief Description of the Drawings]
)rawing 1] It is drawing of longitudinal section of the plastic-molded-type emitter in which one example of this design is
nown.
)rawing 2] It is the graph which shows the directional characteristics of the plastic-molded-type emitter of drawing 1 .
)rawing 3] It is drawing of longitudinal section of the plastic-molded-type emitter in which other examples of this design
re shown.
)rawing 4] It is drawing of longitudinal section showing still more nearly another example of this design.
)rawing 5] It is drawing of longitudinal section of the conventional plastic-molded-type emitter.
)rawing 6] It is the graph which shows the directional characteristics of the conventional plastic-molded-type emitter.
)rawing 7] It is drawing of longitudinal section of the plastic-molded-type emitter which aimed at conventional narrow
rectivity and high transverse-plane intensity.
)rawing 8] It is the graph which shows directivity in case an electrode is located at the center of a luminescence
emiconductor device.
)escription of Notations]
Leadframe
a Crevice
Luminescenc  Semiconductor Device
Resin for Closur
Resin in Crevice
Insulating Substrate
a Crevice

Translation done.]

## RAWINGS

rawing 1]

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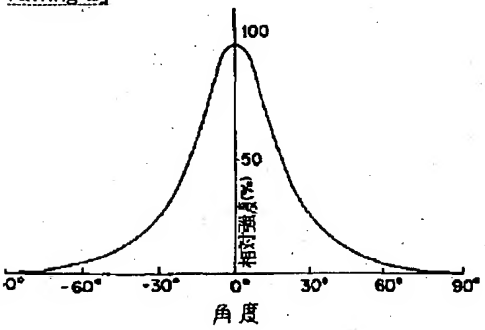


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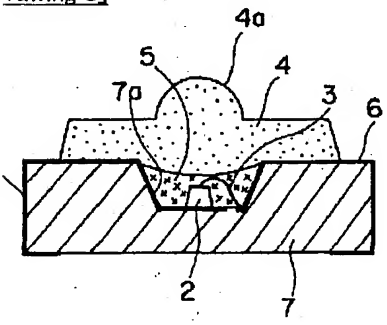


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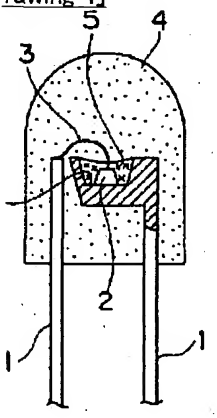


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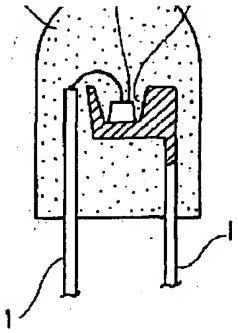
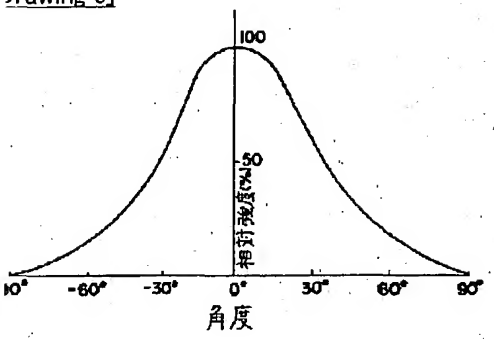
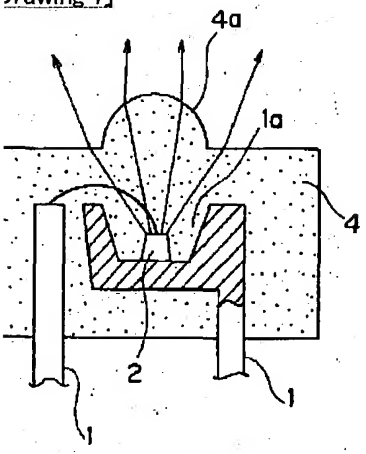


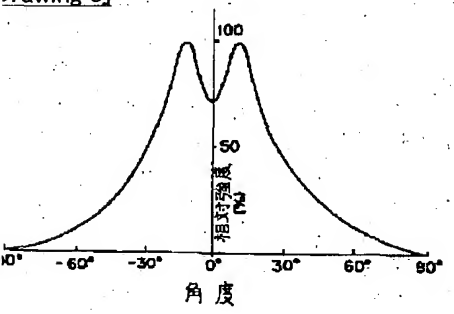

Drawing 6]




Drawing 7]




Drawing 8]

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審査請求　未請求　請求項の数１(全　３　頁)

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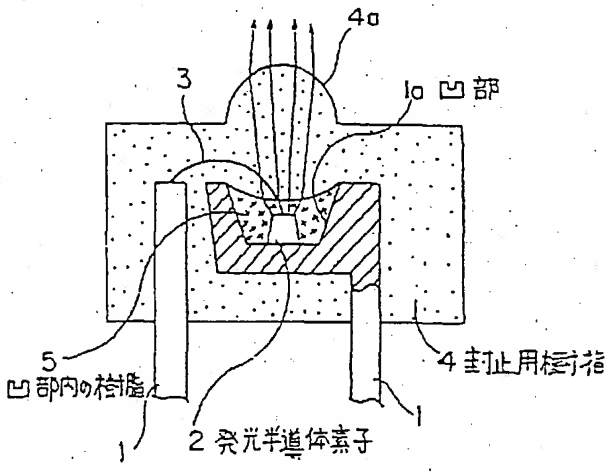
(54)【考案の名称】　樹脂封止型発光体

(57)【要約】
【目的】　レンズ径を小さくしたときの正面強度の低下をなくし、狭指向性および高正面強度を実現する。
【構成】　発光半導体素子２がマウントされる凹部１ａ内を、封止用樹脂４よりも屈折率が小さい樹脂５で封止する。封止用樹脂４と樹脂５との界面を凹面とする。発光半導体素子２で発せられた光を、封止用樹脂４と樹脂５との界面で集光して、封止用樹脂４のレンズに導く。



【実用新案登録請求の範囲】

【請求項1】 凹部内に発光半導体素子がマウントされた樹脂封止型発光体において、前記凹部内を、封止用樹脂よりも低屈折率の樹脂により封止し、その樹脂と前記封止用樹脂との界面を、発光半導体素子の側に窪んだ凹面としたことを特徴とする樹脂封止型発光体。

【図面の簡単な説明】

【図1】本考案の一実施例を示す樹脂封止型発光体の縦断面図である。

【図2】図1の樹脂封止型発光体の指向特性を示すグラフである。

【図3】本考案の他の実施例を示す樹脂封止型発光体の縦断面図である。

【図4】本考案の更に別の実施例を示す縦断面図である。



【図5】従来の樹脂封止型発光体の縦断面図である。

【図6】従来の樹脂封止型発光体の指向特性を示すグラフである。

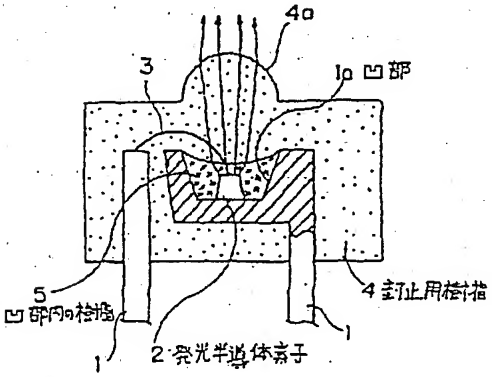
【図7】従来の狭指向性および高正面強度を狙った樹脂封止型発光体の縦断面図である。

【図8】発光半導体素子の中心に電極が位置する場合の指向性を示すグラフである。

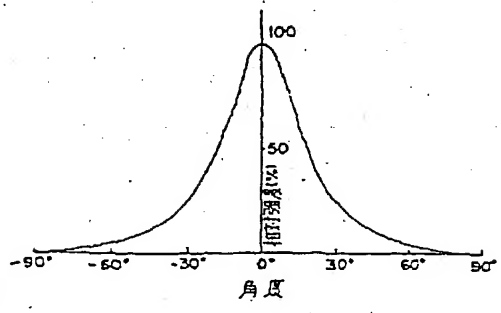
【符号の説明】

1 リードフレーム
1a 凹部
2 発光半導体素子
4 封止用樹脂
5 凹部内の樹脂
7 絶縁基板
7a 凹部

【図1】




【図2】

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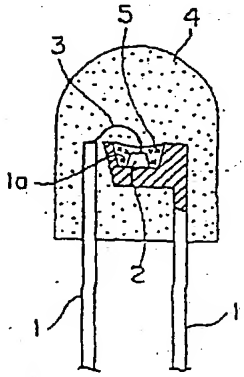
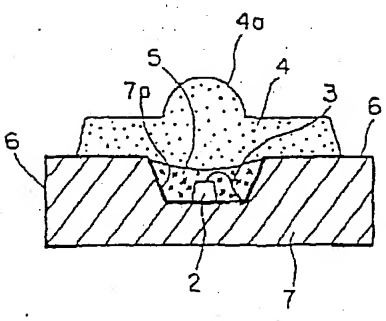
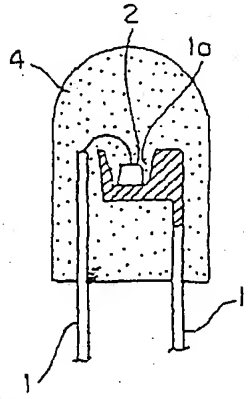


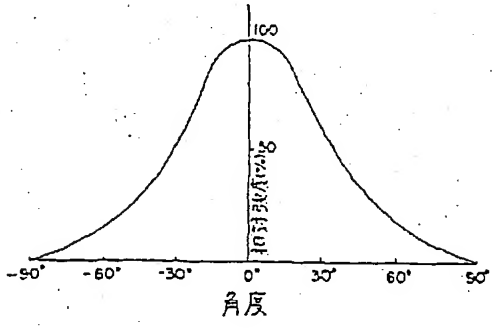

【図3】



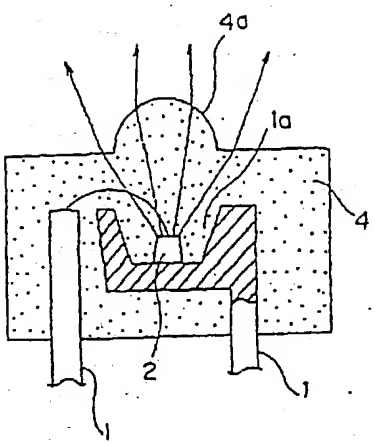

【図5】




【図6】



【図7】




【図8】